

The Arizona Optics Industry Association

The Arizona Optics Industry Association (AOIA) was founded in 1992 as a non-profit organization dedicated to the growth of the optics industry in Arizona (AOIA, c2005). The organization began with about 200 optics related companies joining together to form an optics cluster (SPIE, What is a Cluster?). The members involved in the cluster do not represent merely those offering products in optics, but rather include all services, institutions and organizations connected to optics. The range of products and services include optical design and engineering, fiber optic components for telecommunications, lasers and semiconductors, metrology instrumentation, high precision optical fabrication, high volume precision plastic optics, precision measuring and positioning equipment, microscopes, and telescopes, opto-electronics, image processing, software and optical coatings/thin films. Others involved include everyone from Government agencies such as the US Department of Commerce to area Universities.

Dr. Robert Breault, co-chairman of the AOIA Board of directors, actively works not just with the optics companies in Tucson, but with other groups around the globe to form similar clusters. His intense efforts to form clusters are guided by the recognition that by partnering and working together these companies can achieve more than by working independently. Not only do the companies involved in the cluster benefit from the partnerships, but the whole local economy is stimulated by their collective efforts. Dr. Breault defines a cluster as follows:

a concentration of firms across several industries that creates quality jobs, exports goods and services, shares common economic foundational needs, and unites the public sectors of economic development, legislatures at all levels, universities, community colleges, the K-12 educational community, workforce development,

support foundations, and all community economic stakeholders (SPIE, What is a Cluster?).

Essentially, those involved in a cluster benefit from working together to draw shared attention to their industry and jointly stimulate growth in the field. The members of the cluster include not only businesses, but any organization or institution involved in an optics related field. The members benefit from similar marketing campaigns, shared educational efforts, shared local resources and suppliers, and the development of a strong work force. All of the above benefit and stimulate the local economy by developing relationships between local business and government and community development groups.

The benefit of clustering can easily be gleaned by examining the growth of the optics industry in Tucson. The optics industry in Tucson began in the early 1940s, growing out of the region's growth in astronomy (Catts, 1999). At the time of the formation of the optics cluster in 1992, there were nearly 200 optics related companies, services and suppliers in Arizona, representing about \$100 million in revenue (SPIE, What is a Cluster). The AOIA has worked hard to develop and grow the optics cluster in Tucson, which has since been dubbed "Optics Valley" because of the large and growing number of optics companies located in the region. AOIA has deliberately worked to draw optics related companies to the area including manufacturing, prototype development, consulting services, software companies and all manner of hardware companies. An example of this effort is the Edmund Optics Design and Consulting Center, established in Tucson in 1998 as a direct result of persuasion from Dr. Breault to relocate from California to join the Arizona optics cluster (Jeremy Govier, personal communication, April 12, 2007).

Though just one of many optics clusters around the world, Arizona's AOIA is the most widely recognized, and the effectiveness of such efforts and organization can be seen in the statistics describing the region's optics industry. Survey's were conducted in 1995 and 1999, not long after the formation of the cluster, and published by the Business Development Division of the Arizona Department of Commerce (Catts, 1999). The surveys were meant as meters on the rapidly growing optics industry not just in Arizona, but around the world. The growth of optics-based technologies was anticipated to carry significant "economic benefit to the State of Arizona, and southern Arizona in particular" (Catts, 1999). The report discussed the current status of the rapidly growing field, but the overarching message of the report emphasized the great potential Arizona had as an optics center.

It is interesting, to compare the results to the latest survey of the optics industry conducted in 2006, results to be published in May 2007. The benefits of an optics cluster and mutual support and cooperation are clearly evident in the numbers. The survey includes both optics and nanotechnology firms, though there were few respondents from nanotech companies (Geoffrey Wiggins, personal communication, May 7, 2007). There is not a clear, up-to-date number on the number of optics-related companies in Tucson; however, based on total employment numbers from the most recent survey one might estimate of the number of optics companies in Arizona to be over 1000. This estimate is based on survey data which indicate over 25,535 individuals are employed by Arizona optics and nanotechnology firms with an average of 25 employees per firm (Wiggins, 2007),. A count of members of AOIA from the AOIA member directory indicates there are over 350 companies enrolled as members of AOIA. Compare these numbers to the 1999 report on Arizona Optics, which cited "Arizona's core

optics community [as consisting] of about 160-175 companies/organizations and 6500-6750 employees at the midpoint of 1999” (Catts, 1999). While the survey results are not quite an apples to apples comparison since the latest survey also includes the nanotechnology cluster and the companies the responded to the 1999 and 2006 surveys are not the same, the number of individuals employed in the optics-related organizations in Arizona has experienced a nearly 400% increase over the 8 year period!

Just as important as the number of jobs the optics industry provides in Arizona is the substantial effect these companies have on the economy. The 2006 survey indicates the total annual revenue from the optics and nanotech industries in Arizona is over \$2.3 billion, with average revenue of over \$45 million per firm (Wiggins, 2007). That is no small contribution to the Arizona economy!

Clearly, the optics cluster has greatly benefited the whole optics industry in Arizona, but in particular, it seems to foster a great environment for start-up and small to medium size companies, which can build on the supportive environment of help and support and mutual goals of the organization. The statistics previously cited for number of employees and total revenue have been broken out for the small to medium size optics-related companies, defined as employing fewer than 100 people. An estimated 770 people are employed at small to medium sized companies, averaging 13 employees per firm. Theses small to medium size companies represent \$80.8 million in total revenues and an average of \$1.7 million per company.

The AOIA is an interesting concept because it brings together companies that might otherwise be competitors and has them working together. It’s an acknowledgement that though similar companies compete in their markets, cooperation to bring more awareness to the industry

and more support from local government and efforts to increase the number and quality of the work force drawn to the industry in the area can be mutually beneficial.

A further advantage of AOIA is an organization and context to reflect on what the challenges facing the industry are and how the parties involved can work together to address them. In the 2007 Report “Moving Optics and Nanotechnology Forward in Arizona,” the top five challenges facing optics and nanotechnology firms and organizations as identified by survey respondents include: finding qualified employees, the need for market analysis, local networking opportunities, venture capital and investors and local suppliers (Wiggins, 2007).

Over half, 52%, of the 73 companies that responded the current challenges question on the survey identified the challenge of finding qualified employees (Wiggins, 2007).

Interestingly, the 1999 report identifies Arizona as a great place for an optics-related firm because it is “easy to recruit to, in part because many UA optical science graduates seek to remain in or return to the state” with the second “positive” listed as being the “basic quality of the local workforce is outstanding” (Catts, 1999). These observations are important because it illustrates that the quality of the work force in Arizona is there, and that the challenge is rather the insufficient *number* of qualified workers. As the optics industry continues to grow in Arizona a greater number of talented workers will be attracted to the region. Furthermore, with the University of Arizona’s College of Optical Science continues to grow. There is a continuous influx of new talent, in 2003 OSC graduated “30 highly qualified scientists with masters and doctoral degrees, more than any other institution in the nation” (American Trade and Investment Associates, c2006). In the 1999 report on Optics in Arizona, the Optical Sciences Center was identified as “a national asset for technical leadership in developing new technologies and application for optics” (Catts, 1999). These two aspects, the growing college, and growing

number of businesses, will feed off one another with the former attracting more businesses and supplying more talent to the work force and opportunities available in the later will help to keep graduating students in the region.

25% of the responding optics and nanotechnology firms and organizations in the 2006 survey identified the need for market analysis as one of the current challenges (Wiggins, 2007). The report, *Moving Optics and Nanotechnology Forward in Arizona: 2006 Arizona Optics and Nanotechnology Industry Resource Directory and Analysis*, will go a long way in answering this need.

Similarly, 23% of survey respondents identified the need for local networking opportunities (Wiggins, 2007). That is a direct benefit of AOIA, which, per their website, holds monthly board meetings to which all AOIA members are welcome to attend. In addition, AOIA sponsors monthly cross-cluster mixers, which members from all of Arizona's high-tech clusters including nanotechnology, bio-industry, plastics/advanced composite materials, aerospace, manufacturing and information technology are invited to attend. These are a great opportunity for both cluster members to network and learn how companies in other fields might be able to work together or serve one another's needs, but also for the multiple high-tech clusters in Arizona to learn from and build off of one another.

The AOIA has been very successful in Arizona and in the Tucson valley in particular. The optics industry has undergone tremendous growth in recent years as a direct result of the formation of an optics cluster. The mutual cooperation among companies that directly compete or between companies that might otherwise never engage because their markets do not directly overlap allows small companies to work together to draw interest to the region, compete on a global scale, recruit a highly talented work force, and attract support and attention of the local

government. There are clearly aspects of the AOIA organization that must continue to improve, but the ongoing support and involvement of local companies, institutions and government will be self-enhancing and the businesses and economy will continue to benefit and grow.

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